

# financial assistance

## Financial Assistance — Industries of the Future



Financial Assistance accelerates the development and demonstration of clean, energy-efficient technologies.



Office of Industrial Technologies



Office of Energy Efficiency and Renewable Energy  
U.S. Department of Energy

## Supporting new technology development

The NICE<sup>3</sup> and Inventions and Innovation programs have supported technologies resulting in cumulative energy savings of over 500 trillion Btu. In addition to energy savings, other benefits such as productivity improvements, higher product quality, and enhanced environmental performance also result from implementing these technologies.

NICE<sup>3</sup> has leveraged \$26.3 million in federal funds, with \$81.8 million in state and industry funds since 1991, supporting 91 projects across the U.S. More than 500 inventions have received financial support from the Inventions and Innovation program (and its predecessor, ERIP), with nearly 25% reaching the marketplace.

For more information on OIT's Financial Assistance programs, visit [www.oit.doe.gov/NICE3](http://www.oit.doe.gov/NICE3) and [www.oit.doe.gov/inventions](http://www.oit.doe.gov/inventions)

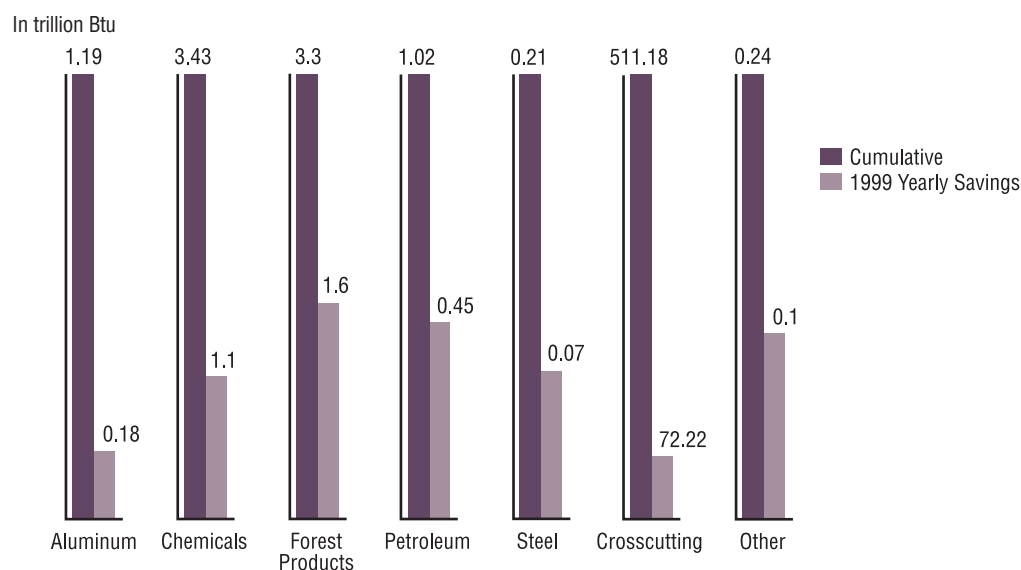
## Financial Assistance helps technology innovators develop and deliver clean, energy-saving technologies to the marketplace

In today's competitive world markets, the success of U.S. industry hinges—more than ever—on technological advances. Yet, too often, innovative technologies never reach the marketplace at all, or they fail to connect with the companies that could realize the greatest cost-saving and productivity-enhancing benefits.

Hurdles are particularly steep for innovative technologies whose developers may lack the funds and know-how to move promising ideas from the research bench to the marketplace. In addition, emerging technologies face a tremendous barrier to acceptance in the industrial manufacturing sector unless there are full-scale demonstration results. Through OIT's Financial Assistance programs, successful participants can receive important financial and technical assistance to speed the development of new energy-saving, environmentally friendly technologies and demonstrate their potential savings and commercial value.

Two OIT programs—**Inventions and Innovation** and **NICE<sup>3</sup>** (National Industrial Competitiveness through Energy, Environment, and Economics)—provide independent inventors, technology developers, and industry with easy access to a flexible package of services.

### Financial Assistance Projects Save Energy for U.S. Industry



OIT's NICE<sup>3</sup> and Inventions and Innovation programs have cumulatively saved U.S. industry more than 0.5 quads of energy. In 1999 alone, these programs saved more than 75 trillion Btu.



## Inventions and Innovation—from mind to market

OIT's Inventions and Innovation program is committed to providing inventors and small technology-based companies with financial and technical assistance to support the development and deployment of innovative energy-related technologies.

Two levels of financial assistance are available. Grants of up to \$40,000 are awarded for early-stage concept development and feasibility, and grants of up to \$200,000 are available for prototype development. All grants are awarded through a competitive solicitation

process with a focus on ideas that have significant energy savings impact and future commercial market potential.

While the core of the program is financial assistance, Inventions and Innovation also guides inventors through the development and commercialization process by helping them find technical partners, commercial sponsors, business plan resources, and other funding sources.

## NICE<sup>3</sup>—demonstrating the potential benefits of new technologies

Technologies that save energy, reduce waste, and are economically competitive can receive financial assistance to demonstrate their capabilities through the NICE<sup>3</sup> program.

Technologies that can be transferred across a broad range of applications and across industrial sectors are a key target, especially those that apply to the nine energy-intensive Industries of the Future.

State agencies in partnership with industry can submit applications to demonstrate technologies that

are ready for commercialization. Through NICE<sup>3</sup>, the state/industry applicant may receive a one-time grant of up to \$525,000 in federal funding (up to \$500,000 for the industry partner and up to \$25,000 for the state agency) for up to three years, with the stipulation that the industrial partner match these funds with a minimum 50 percent cost-share. Companies that receive NICE<sup>3</sup> grants agree to help commercialize their technologies inside and outside of their companies or agree to share results with other companies.

*"With the help of the NICE<sup>3</sup> grant, we have been able to develop and prove that this new process is technically viable, energy efficient, and environmentally friendly. Furthermore, the process dramatically increases productivity, which helps level the playing field when competing with imported fabrics."*

*Bob Cruise  
Brittany Dyeing and Printing Corporation*

*"We at MSS are gratified that the ELPAC™ technology enhances separation and decreases energy usage in industries as diverse as glass recycling, aluminum recovery, and detection of metallic contaminants in auto tire manufacturing. Assistance from the Inventions and Innovation program was a key component of commercializing this unique technology."*

*Garry Kenny  
ELPAC™ Inventor  
President of MSS*

## Financial Assistance helps Industries of the Future boost bottom-line performance

OIT's centerpiece strategy is the Industries of the Future, a partnership process that engages each participating industry in developing its vision of a more resource-productive and energy-efficient future and in defining technology developments critical to realizing this vision.

Nine major industries—agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum, and steel—are participants in the Industries of the Future initiative.

### Financial Assistance supports R&D priorities

Based on the industry visions and their priorities, the Financial Assistance program has supported industry efforts by funding innovations and demonstrations that encourage cost savings, improve productivity, and increase competitiveness.

**Agriculture**—Fermentation system increases yields and cuts process time for converting carbohydrates to ethanol. Bio-Process Innovation, Inc.,

developed a cascade reactor for ethanol production from carbohydrate feedstock. Using the cascade system, this invention will reduce the time to process a feedstock by up to half the time a conventional system uses.

**Aluminum**—Technology for recovering aluminum dross/saltcake saves energy and reduces waste. The closed-loop system developed by ALUMITECH is capable of processing approximately 240 million pounds of dross or more per year, recovering approximately 15 million pounds of aluminum and 158 million pounds of NMP that would otherwise be landfilled.

**Chemicals**—Powder antichip primer coating reduces energy use and eliminates waste streams. Chrysler and its partners developed and implemented an innovative powder antichip painting process that is highly efficient, with a ratio of paint solids deposited to solids used exceeding 90 percent. The new process virtually eliminates solvent use and the resultant emissions, treatment, and incineration, as well as paint overspray particulate waste.

### Indirect-fired kilns turn aluminum scrap into valuable feedstock

Since the beginning of 1997, an innovative process has been demonstrated for turning aluminum scrap from stamping plants and used aluminum into feedstock that secondary smelters can use to produce new products. The NICE<sup>3</sup> program and Philip Services Corporation (formerly Roth Brothers Smelting Corporation) are cost-sharing the demonstration to decoat metal using indirect-fired controlled atmosphere (IDEX<sup>TM</sup>) kilns. Foremost among the benefits of the new system is its use of the volatile contaminants' inherent energy as heat in the decoating process. By capturing and utilizing these fumes in an after-burner, less natural gas is required.

#### Benefits per system

<b>Energy savings:</b>	920 Btu/lb of aluminum scrap processed (for one plant this equated to 0.11 trillion Btu/year)
<b>Annual cost savings:</b>	\$200,000 in natural gas costs \$250,000 in avoided environmental costs
<b>Productivity :</b>	Increases yield by several million dollars/year





**Forest Products**—Resins created from pulp mill waste replace petroleum-based resins. Lenox Polymers, Ltd., has developed specialty polymers created from renewable wood resources that emit no hazardous materials during production or use, and have durability, flame resistance, and cost advantages over phenolic resins and urea formaldehyde resins. These resins are suitable for use in the foundry, urethane foam, particleboard, plywood, construction, furniture, automotive, plastics, and marine industries.

**Glass**—New furnace technology improves glass fiber production. Vortec Corporation designed, engineered, constructed, and operates a prototype glass fiber furnace that will reduce energy consumption and improve product quality. The technology uses a revolving doughnut-shaped melter that distributes the molten glass evenly and provides a uniform, energy-efficient melting temperature.

**Metal Casting**—Laminated Object Manufacturing (LOM) speeds product development and cuts prototyping costs. Helisys has developed the LOM machine that works with computer design software to produce physical objects. Using high-quality paper, plastic, or a composite, the LOM machines can produce small, intricate, thin-walled models and masters; complex, thick-wall casting patterns; and solid cores, forming tools, and cavity molds.

**Mining**—Wireless communications are being developed for the mining industry. Transtek, Inc., is developing a wireless communications system for the underground mining industry. The telemetry technology uses electromagnetic field forces to transmit communications through the earth, thereby replacing less reliable hard-wire systems.

**Petroleum**—Fluid catalytic cracking improvements promise higher yields at lower costs. Process Innovators is developing a low-profile fluid catalytic cracking technology that maximizes product yield and value and reduces the amount of feedstock converted to less useful products such as heavy cycle oil and light fuel gas.

**Steel**—Oxy-fuel burners reduce energy use at steel mills. Praxair, Inc., supplier of oxygen and other industrial gases to the steel industry, has introduced an innovative oxy-fuel burner technology to the steel reheating industry through a demonstration project at Bethlehem Steel's Burns Harbor plant. Oxy-fuel combustion reduces or eliminates nitrogen in combustion air and substantially reduces waste heat carried out with flue gas.

### **Hydrochloric acid recovery system allows galvanizers and smaller steel manufacturers to reduce hazardous waste and costs**

Hydrochloric acid (HCl), a toxic, corrosive chemical used to clean new steel and remove rust, requires costly transportation and disposal. In 1993, NICE<sup>3</sup> awarded Beta Control Systems, Inc., of Beaverton, Oregon, and the Oregon Department of Energy a \$97,000 cost-shared grant to help commercialize a recovery system. The Beta recovery technology prefilters the used acid solution, then vaporizes the water and acid to leave ferrous chloride behind, a valuable agricultural product. The water/acid vapor is condensed into HCl, reconcentrated, and recycled back to the pickling tanks.

#### **Benefits per system**

**Cost savings:** Average per-ton cleaning costs reduced from \$14 to \$3.40

**Energy savings:** Estimated at 24 billion Btu per year over conventional transportation and disposal energy use, based on 25,000 liters per day (full capacity)

**Payback:** 1.4 years, based on a one-gallon-per-minute system. Life expectancy exceeds conventional systems by three years

**Potential revenue:** Ferrous chloride, marketable at up to \$100 per ton



# resources

## A comprehensive portfolio for today and tomorrow



### Industrial dryer control system saves energy, time, product, materials, and costs

Independent inventor John Robinson created a sensor and control device, the Delta T Dryer, that monitors product moisture content inside industrial dryers and readjusts the time and temperature of the drying cycle. This technology improves industrial dryer efficiency by eliminating overdrying, underdrying, and redrying of products such as wood, grains, and textiles. An Inventions and Innovation grant of \$83,323 funded demonstrations across various industries, as well as helped to develop customized control mechanisms for different dryers.

#### Benefits

Improved product quality, consistency, and integrity

Average energy cost savings: 10% to 20%

Average production increase: 10%

The Financial Assistance program is an integral part of a complementary portfolio of programs to promote the development and use of energy-efficient, pollution-preventing technologies.

To help industry access and ensure timely implementation of its technologies and capabilities, OIT has developed an integrated delivery approach for products, services, and emerging technologies.

### Enabling Technologies

OIT works with industry, the national laboratories, academia, and others to research, develop, and commercialize enabling technologies that can benefit a wide range of industries. In **Industrial Materials**, the focus is on strong, durable materials that can withstand harsh, high-temperature industrial environments. Efforts in **Combustion** target clean, cost-effective technologies that will increase productivity, improve energy efficiency, reduce emissions, and enhance fuel flexibility. Research in **Sensors and Controls** addresses such challenges as improving sensor reach and accuracy in harsh environments and providing integrated measurement systems.





## BestPractices

Through the BestPractices program OIT helps manufacturers apply existing technologies to save money, cut emissions, and reduce wastes. OIT alerts companies to opportunities for funding, tools, expertise, and potentially applicable technologies in OIT's extensive portfolio of crosscutting products and services. The returns for industry can be significant.

**Plant-wide assessments** are also offered by BestPractices, helping manufacturers develop a comprehensive strategy to increase efficiency, reduce emissions, and boost productivity. Up to \$100,000 in matching funds is awarded for each assessment through a competitive solicitation process. Participants agree to a case study follow-up of results. Alternatively, small to mid-sized manufacturers can take advantage of the **Industrial Assessment Centers** program, which provides no-charge assessments through a network of engineering universities.

## State-Level Industries of the Future

In addition, **State-Level Industries of the Future** programs are starting up in a number of states to bring the energy, environmental, and economic benefits of industrial partnerships to the local level.

## How to get involved

*There are two ways to become involved with the OIT Financial Assistance programs: You can apply for financial assistance or you can utilize one or more of the technologies sponsored by these programs.*

- Solicitations for NICE<sup>3</sup> and Inventions and Innovation are conducted annually. Information on the schedule is available on their web sites ([www.oit.doe.gov/inventions](http://www.oit.doe.gov/inventions) or [www.oit.doe.gov/nice3](http://www.oit.doe.gov/nice3))*
- Information about upcoming events, workshops, pre-proposals, solicitations, and deadlines is posted on the Internet at <http://www.oit.doe.gov>.*
- Materials on the Financial Assistance programs or any of the projects funded under the programs can be obtained by calling OIT's Resource Room at (202) 586-2090, or the OIT Clearinghouse at (800) 862-2086*

For more information, please contact the  
OIT Clearinghouse at (800) 862-2086.

[www.oit.doe.gov/inventions](http://www.oit.doe.gov/inventions)  
[www.oit.doe.gov/nice3](http://www.oit.doe.gov/nice3)



For more information on Financial Assistance,  
contact the OIT Clearinghouse at (800) 862-2086  
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least 50% wastepaper, including 20% postconsumer waste.

February 2001  
DOE/GO-102001-1210